MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2015/2016

EBT3016 – TELEMEDICINE TECHNOLOGY
(BE)

5 OCTOBER 2015
9.00 a.m - 11.00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 5 pages with 4 questions only.
2. Attempt ALL **FOUR** questions. All questions carry equal marks and the distribution of marks for each question is given.
3. Please write all your answers in the answer booklet provided.

Question 1

(a) Define and compare the terms telemedicine, telehealth and telecare.

[5 marks]

(b) An uncompressed CT-scan image is to be transferred to a neurologist for diagnosis. The image contains 1024 x 768 pixels with 4 bytes/pixel. Calculate the time taken to transmit the image over a

i. 56 kbps modem channel

ii. 1 Mbps cable modem

iii. 10 Mbps Ethernet and

iv. 100 Mbps Ethernet.

[4 x 3 marks]

(c) Healthcare providers have variety of choices when selecting a transmissions system for telemedicine purposes. Make a comparison between coaxial cable and satellite based on these four consideration factors: type of information, speed, security and cost.

[8 marks]

Continued...

Question 2

(a) Telepsychiatry is a subspecialty of telemedicine that provides or supports clinical psychiatric at a distance. State five specific requirements to deliver a telepsychiatric system.

[5 marks]

(b) Among the twisted-pair wire, microwave, satellite and optical fiber communication systems, indicate which one fits best for the following telemedicine application. State the reason.

i. A campus emergency response team transmits physiological signals of a student in a mobile ambulance to a hospital 20 km away.

ii. An aircrew member delivers medicinal information of a traveler from an airplane flying at 20,000 ft.

iii. A radiologist sends a CT image to an oncologist within the same hospital for teleconsultation.

iv. A surgeon in New York performs a telesurgery on a patient 6,230 km away in Strasbourg, France.

[3 x 4 marks]

(c) Intermediate or widespread implementation of telesurgery is hindered by many factors. One of them is the lack of guidelines and protocols. Design a set of guidelines for telesurgery that serves to prevent malpractice liability.

[8 marks]

Continued...

Question 3

(a) Security attacks on healthcare information can be generally categorized into four types.

i. Briefly explain the four categories of security attacks.

[2 x 4 marks]

ii. Identify the type of security violations for each of the cases below:

1. Dr. Ali transmits a medical file to Dr. Lee for referral. The file contains sensitive information (e.g. patient personal information) that is to be protected from disclosure. A technician in IT department who is not authorized to read the file is able to monitor the transmission and capture a copy of the file during transmission.

2. A network manager of a hospital sends a message to the hospital administrator who is under his management. The message instructs the hospital administer to update an authorization file to include the identities of a number of doctors who are to be given access to the hospital network. A doctor retrieves the message, alters its content (add and delete entries) and then forward it to the hospital administrator who accepts the message as coming from the network manager and updates the authorization file accordingly.

[1 x 2 marks]

iii. Identify which security service (confidentiality, integrity or availability) is being compromised for each of the cases above. State your reason.

[2 + 2 marks]

(b) Suppose Dr. Ali wants to generate a pair of RSA public and private keys to establish a security link. He starts by selecting two primes, $p = 7$ and $q = 13$. Please help Dr. Ali to generate the pair of public and private key.

[11 marks]

Continued...

Question 4

(a) The April 2015 Nepal earthquake killed more than 8,000 people and injured more than 23,000. The calamity also triggered an avalanche on Mount Everest that claimed that lives of at least 19 people. Describe the challenges of life-saving operation for Nepal earthquake and explain how telemedicine can assist the country in dealing with the disaster.

[13 marks]

(b) The Ebola outbreak in West Africa and MERS (Middle East Respiratory Syndrome Coronavirus) outbreak in Korea have exposed the world's inability to provide a rapid response to an infectious disease crisis. A strong healthcare system that is coupled with a telemedicine system is said to be helpful in controlling the spread of the communicable disease. State your opinion.

[12 marks]

End of Paper